



PlantMap3D:ModCam

Modular camera system for mapping plants

The Challenge: Farmers and researchers face a similar problem – large fields or plots to manage, with a growing need for precision, speed and accuracy in the face of mounting pest resistance, degraded soils, and weather extremes. Cover crops, row crops, and weeds don't grow uniformly across a field or research plot, which means managing or documenting them is a highly variable experience. We lack affordable, open-source AI-trained tools that can produce real-time plant ID, and quantify biomass and density, for farmers and researchers to make swift and effective decisions about field, crop and research management.

Our Response: PlantMap3D:ModCam (PM3D) is a camera system that deploys models trained by the National Agricultural Image Repository (AgIR) for phenotyping in breeding and plant science research, as well as on-farm mapping and plant ID.



The system uses relatively inexpensive, off-the-shelf camera technology and open-source hardware and software to generate maps of plant species and biomass in real time.



PM3D collects RGB (color) images for species mapping and grayscale stereo images to estimate plant height. The height data is used to estimate biomass for each individual species.

PM3D can be customized for use by farmers, researchers, and other stakeholders. For each customer, our Data Services Team supplies cloud image storage, custom software for delivering near real-time analysis and visualization, and hotline support.

PlantMap3D:ModCam is a customizable system of stereo and RGB cameras that can be mounted on a tractor or sprayer boom. It's ideal for farmers and agricultural consultants working in production fields. We provide the data collection devices, as well as technical support for equipment installation and maintenance. We also offer a one-camera system ideal for smaller farms and research plots.

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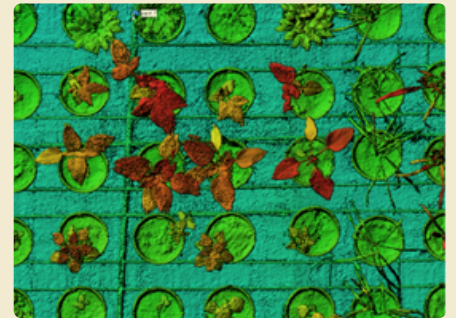
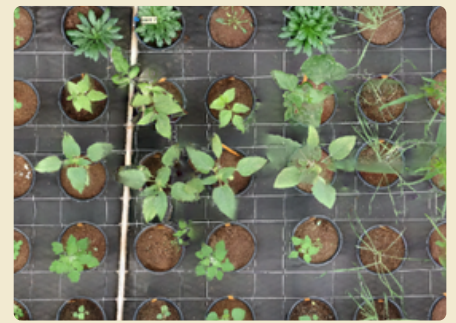
PlantMap3D: ModCam Specifications

System Overview

The PlantMap3D:ModCam platform is a highly adaptable, retrofittable imaging system designed for seamless integration across diverse field applications. Its flexible architecture supports both a lightweight, hand-held single-camera configuration and a fully mounted multi-camera installation on spraying equipment. PM3D has been deployed on machinery ranging from 30- to 120-foot booms without requiring major structural modifications or permanent hardware changes. Its modular design enables power sourcing from a compact, portable power bank in handheld mode or existing cabin power outlets or directly into the power line, providing broad compatibility in equipment-mounted deployments. Built with durable, corrosion-resistant materials, the system is engineered to withstand harsh conditions while maintaining reliable performance in demanding agricultural settings.

Requirements for Commercial Level Deployment

- PM3D is compatible with most sprayers, with proven installations on 30-ft to 120-ft booms
- A power outlet in the sprayer cabin is preferred; a direct power-line connection is also possible.
- Minor external mounting of components needed; no drilling or deformation of existing sprayer components should occur.
- Operator cooperation during installation is essential (providing photos, measurements, and equipment specifications).
- Routine rinsing of PM3D components is recommended to reduce chemical buildup and corrosion.
- **Note:** A slight weight shift is possible when installing the main system box.



Dataflow

Images taken by the cameras are tagged with a timestamp and gps coordinates. These images can then either be analyzed on-device to give immediate feedback to the operator or grower or they can be saved and transferred off the device to be used later.

